

SUPPORT FRAME FOR AUTOMOBILE VEHICLE SUNROOFS**DESCRIPTION**

5 The invention relates to a support frame for sunroofs, also termed window tops
which are fitted in the roof of automobile vehicles and the specific function of
which is to serve as structure and support, logically, of the sunroof assembly
with its operating mechanisms, as well as incorporating the guidance system,
water drainage elements, channels for the tow element, and the anchorages for
10 its assembly on the bodywork.

In the measure of what is known, the cited functions of a support of this type are
implemented at the present time by different pieces which are mounted in a
single assembly which satisfies the aforesaid functions.

15 Thus, and within these known techniques, there exist among others, supports
based on mixed aluminium and plastic structures which constitute two lateral
guide rails, the great majority implemented by profiles in extruded aluminium,
and a front crosspiece, generally of injected plastic, in which are incorporated
20 the motor, a baffle, the guiding channels of the tow element, and the drip rails.

Other types of supports for sunroofs are also known which are configured from
a single piece of extruded aluminium, which is bent until the form of the
structure is achieved, in which and subsequently the different pieces are
25 installed just as in the previous case.

In both cases, and in addition to the components cited, these solutions
incorporate a variable number of ancillary pieces, among which the most usual
are:

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- Systems for water to run off made by plastic injection, usually two
or four drip rails.
 - Tubes for guidance of the tow element excess.
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- Moveable element intended to cover internally the gap made in the roof trim. Said element is usually rigid like a moveable decoration or cover, or flexible like curtains.
- 5 - Air baffle which acts in the cases of the moveable panel being open and which is hidden under the same in the remaining positions.

10 The drawbacks of these known supports rest fundamentally in the number of pieces and different materials which constitute the same as well as in the profusion of auxiliary items which have to be incorporated for the final concept of an acceptable support and, as a consequence thereof, the additional cost and risks produced by handling several different references as well as the assembly of all the components.

15 In contrast to these known techniques, the objective of the invention is a support frame for sunroofs which is implemented in a single piece, which implies a reduction in the number of references and the consequent reduction in the number of manufacturing stages, as well as in the time employed in the manufacture.

20 manufacture.

25 Another objective of the invention is a support frame for sunroofs which in the construction thereof uses only one material with a single manufacturing technology, normally injection of the fused material in a closed mould, like for example thermoplastic plastics or light alloys, which implies simplifying the manufacturing process, and simplifying later actions for the recycling thereof.

30 A further objective of the invention is a support frame for sunroofs which allows the process to be simplified and the manufacturing times to be shortened and the weight of the element to be reduced.

35 Yet another object of the invention is a support frame for sunroofs which allows the assembly in each lateral longitudinal element of a slide perfectly guided and controlled according to the X, Y and Z axes, and on which is mounted the moveable panel of the sunroof or window top.

Another final object of the invention is a support frame which is economical to manufacture and which can be put on the market at a lower cost than the usual article.

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For the implementation of these objectives, the invention claims a support made in injected either plastic or light alloy material which is configured in a single piece structured in a U-shape, with the possibility of incorporating one or more crosspieces which give it rigidity and collaborate in maintaining the spacing
10 between the two longitudinal elements and the front element which constitute it.

On the two longitudinal elements, other elements are made integrated therein among which are the following:

15 A. – Points for anchoring to the bodywork of the vehicle, in the number and size that are necessary.

B. - Support and guiding channels for the tow element which carries the slide and for the tow element excess determined by the position of the slide.

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The channel for guidance of the element driving the slide has to be prepared not only to carry the tow element, but also to guide and hold the slide itself, while the channels for the tow element excess, would be conceived solely to guide the excess part of the aforementioned tow element.

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The guiding channel for the tow element is conceived in the body of the frame based on a number of lower semi-cylindrical forms which emerge convexly downwards, in alignment and alternating with others above with the opposite orientation to the preceding ones, so that between the two said guiding channel
30 is defined with tubular form.

In the areas of the guiding channel in which the pulling slide runs, the upper semi-cylindrical forms are open, comprising an angle of 90 degrees.

35 Another alternative for the embodiment of the channel of the tow element in the

area through which the slides run, consists of a downwardly convex lower semi-cylindrical continuous channel and upwardly convex confronting upper arches in discontinuous arrangement, left and right, which do not meet each other, and leave a free space at the top. So that these arches can be fabricated by
 5 injection, there are gaps in the lower semi-cylinder and the horizontal projection of said gaps coincides with the horizontal projection of the aforementioned arches.

This configuration offers in its transverse section an open circular gap, through
 10 which opening the necessary passage is facilitated for the support elements of the slide for the guided carriage and holding of the same inside the gap, so that it cannot be displaced in any direction contained in the plane perpendicular to the direction of displacement of the slide.

15 The guide for the tow element excess, which need not carry more than the tow element itself, is implemented in a similar manner, with separate and alternating semi-cylindrical portions, some downwardly convex and others upwardly convex, so that they follow each alternately, constituting thereby a tubular guiding channel. The upper upwardly convex portions are positioned in the gaps
 20 which are created between the downwardly convex lower portions.

C. - External and lateral guides running the length of the longitudinal elements for the carriage, guidance and holding of the slide which is moved by the action of the tow element, are those which will opportunely be clasped by a projecting
 25 portion of the slide, the contribution of which is to prevent undesired displacements of the slide according to the Z axis.

D. - Another pair of also external and lateral guides, for the guidance of the moveable trim or curtains of the sunroof, below the set previously mentioned.
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E. - A support, underneath this last guide for receiving a joint of roof trim and support.

F. - A free area to allow the passing of the slides, which has a bottom for the
 35 passing of the lower portion of the slide on which the tow element acts. Said

passage is determined by the gap offered by the semi-cylindrical projections and the quarter-cylinder projections mentioned above, concerning which more will be explained later.

- 5 This area for the passing of the slide, comes with two lateral walls on which ride two lateral surfaces of the slide, controlling said slide in its possible displacements according to the Y axis, perpendicular to the displacement of the slide in the horizontal plane.
- 10 G. - Lateral drip rail for drainage of the water which may come to penetrate between the moveable panel and the rest of the roof of the bodywork.

The front part of the support of the invention, incorporates in turn the following elements:

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H. - Points for anchorage of the assembly on the bodywork.

- I. - Channels for the tow element and for the tow element excess, which in this case would be the same, based on semi-cylindrical portions identical to those previously mentioned for the sides, since they would not require the passage of the slide. These channels of the front part are already contemplated in the previous techniques, being therefore known.
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J. - Area of anchorage of the joint of the roof trim and support.

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K. - Front drip rail which allows, in the event, the housing of a baffle.

L. - An area for the anchorage of the motor driving the system for opening the window top.

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With regard to the slide, the invention envisages the embodiment of two lateral walls, which abut on two others corresponding of the longitudinal elements, which have already been referred to.

- 35 The slide also incorporates a lateral projection bent back on itself, which is

inserted in the corresponding guide made in the longitudinal elements, regarding which mention was made previously.

5 The support assembly can incorporate transverse reinforcements in its lower face and along its geometry to give greater rigidity to the support if necessary, in which case they would be an integral part of the support itself.

The drip rail of the support will converge, preferentially, in at least one outlet for drainage of the incoming water through known means.

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The assembly of the invention is represented in the accompanying sheets of drawings, in which the following is described in a non-restrictive manner:

- Figure 1, is a perspective of the support object of the invention.
 - 15 - Figure 2, is an enlarged detail in perspective of the upper face of the longitudinal elements of the support, according to the invention.
 - Figure 3, consists of the section on the plane I-I, made in fig. 1, incorporating the slide not represented therein.
 - 20 - Figure 4, is a detail of another possible geometry for the channel of the tow element for the areas through which the pulling slide runs.
- 25 With regard to fig. 1, the U-shaped support is pointed out, with its two longitudinal elements (2) and the front element (1), together with a reinforcing crosspiece (3), constituting a single unit.

30 In the longitudinal elements (2) the anchorages (4), the channels (10) for the tow element, and the slide are appreciated, as well as the channels (6) for the tow element excess in the event, and the drip rail (12). The inner longitudinal side (24) is that which includes the guides for the slide and for the guidance of the moveable panel, as well as the housing for the joint.

35 In the front part (1) the channels are also appreciated for the tow element and

tow element excess (6) similar to those corresponding in the longitudinal elements, the drip rail (12) and the area prepared for the seating (22) of the motor.

- 5 In fig. 2, the specific geometry is observed of the tow element channels (10) and of the tow element excess (6). The alternate combination can thus be appreciated of the semi-cylindrical areas (5), downwardly convex, separated regularly by gaps (11), and in opposition the cylindrical areas (9) which cover an angle of 90 degrees and are upwardly convex, being located in the vertical of
10 the gaps (11).

This combination configures a circular interior gap having the open spaces which offer the 90-degree segments, making possible the passage of the tow element and reception and guidance of the corresponding end of the slide,
15 which end is linked with the circular slide itself through the opening of the areas (9) with respect to the body of the support.

On the other hand, the channel (6) for the tow element, when it does not include the slide is defined by upper (7) and lower (8) cylindrical areas displaced one
20 with respect to the others and confronting to configure a circular gap.

In fig. 3, the slide (16) is observed housed in the longitudinal elements of the support with the seat thereof in the base (25, 25') of these last items and having the lateral control which the walls (15, 17) confer upon it.
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In this same fig. 3, the seat area (25, 25') for the slide is pointed out, above the mounting of the guiding channel of the tow element (10). The elements are observed for the anchorages (4) as well as the drainage surfaces.

- 30 On the lower part of the slide (16), the links (23) of the same are appreciated with the cylindrical end (13) which will be lodged in the channel (10). On this end (13), the tow element is connected for transmission of the force moving the slide, and the links (23) can run freely thanks to the openings availed by the 90-degree arched projections (9) of the longitudinal elements.

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The slide (16) shows the bent projection (18) whose end is inserted in the corresponding guide (19) in the longitudinal elements, the guide (20) being represented underneath for the moveable trim or curtains and the guide (21) for assembly thereupon of the joint which clasps the roof trim and the support.

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Adjacent to the position of the slide (16) and to the left according to this figure 3, the drip rail (12) is seen and the surface area for the various anchorages (4), which gives passage to the guiding channel (6) of the tow element excess, defined by the two semi-cylindrical areas (7, 8), alternate and in confronting position.

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Below this area, an example is also observed of one of the previously mentioned transverse ribs (26) for reinforcement.

15 The drip rail (12) extends toward the front part (1) of the support as do the guides for the tow element.

From figure 4 the specific geometry of the tow element channels is observed, with the downwardly convex lower semi-cylinder (29), the arches (27), upwardly convex which define the upper face of the channel of the tow element, and the gaps (28) of the lower semi-cylinder (29) which allow the injection of the upper arches (27).

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